

## ***SAMPLING SOIL AND VEGETATION AT FACILITY SITES***

### **Purpose**

This Meteorology and Air Quality Group (MAQ) procedure describes the process for collecting soil, sediment, and vegetation samples from Material Disposal Area G (Area G) at TA-54, the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility at TA-15, and the Plutonium Facility at TA-55 as part of the Soil Monitoring Program, as mandated by DOE Order 450.1.

### **Scope**

This procedure applies to the individual(s) assigned to collect samples from the facilities as part of the Facility Monitoring Program in MAQ.

### **In this procedure**

This procedure addresses the following major topics:

<b>Topic</b>	<b>See Page</b>
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Who Requires Training to This Procedure?	2
Worker Safety	4
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### **Signatures**

Prepared by:  _____ Phil Fresquez, Environmental Surveillance Team Leader	Date:  <b>03/31/05</b>
Approved by:  _____ Terry Morgan, QA Officer	Date:  <b>03/31/05</b>
Work authorized by:  _____ Jean Dewart, MAQ Group Leader	Date:  <b>03/31/05</b>

04/04/05

## **CONTROLLED DOCUMENT**

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## General information about this procedure

**Attachments** This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Hazard Review	3
2	Environmental Surveillance Team Chain-of-Custody Record	1
3	Soil Sampling Equipment and Diagram	3

**History of revision**

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	10/4/96	New document.
1	3/99	Reformatted in accordance with LIR300-00-01, Safe Work Practices.
2	4/01	Added new Section 9.0, Training.
3	4/02	Change in directorate.
4	4/03	Team name change to Environmental Surveillance.
5	5/12/04	Updated and reformatted document to conform with MAQ procedures.
6	04/11/05	Quick-change revision to convert HCP attachment to HR.

**Who requires training to this procedure?**

The following personnel require training before implementing this procedure:

- MAQ personnel assigned to collect samples

**Training method**

The training method for this procedure is **on-the-job** training by a previously-trained individual and is documented in accordance with the procedure for training (MAQ-024).

Annual retraining is required and will be by self-study (“reading”) training.

**Prerequisites**

In addition to training to this procedure, the following training is also required prior to performing this procedure:

- First Aid
- Cardiopulmonary Resuscitation (CPR)
- RRES-ES-Field, “General Field Safety for All Employees”
- Site-specific training for Area G and DAHRT

## General information, continued

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### Definitions specific to this procedure

Soil: Surface soil includes material from the 5-cm (0- to 2-in.) depth.

Composite sample: Samples composed of the five sub-samples taken from an area.

Grab samples: A single sample taken from a specific location at a given point in time.

Sediments: Surface runoff material from ephemeral and perennial stream bottoms.

Vegetation: Top growth material of plants.

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### References

The following documents are referenced in this procedure:

- MAQ-024, "Personnel Training"
  - MAQ-026, "Deficiency Reporting and Correcting"
  - MAQ-706, "Processing and Submitting Samples"
  - RRES-ES-Field, "General Field Safety for All Employees"
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### Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

## Worker Safety

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### Precautions and limitations

This document establishes the basic requirements for collecting soil samples. Work performed under this procedure by LANL personnel will occur only after required training to applicable documents has been completed and documented.

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### Safe work practices requirements

Project Personnel - A minimum of two people is required to go out in the field.

Personal Protective Equipment - For sampling, the following personal protective equipment must be worn: safety glasses, safety/field shoes, rubber gloves, and a hat.

Do not perform work under conditions you consider unsafe. Before beginning work described in this procedure, review safety needs and requirements, identify hazards, and develop hazard mitigation measures.

## Sample Collection

### Sampling information

Types of Samples Collected - Sampling occurs at three sites, Area G (TA-54), DARHT (TA-15), and the Plutonium Facility (TA-55), where three types of samples are collected:

- soil,
- sediments, and
- vegetation: understory (grasses, forbs, and/or shrubs) and overstory (tree).

### Number of samples

The following table indicates the number of composite (c) or grab (g) samples that should be collected from each area. These numbers may vary according to funding provided by the customer. Drought conditions may also reduce the number of vegetation samples that can be collected.

	TA-54	TA-15	TA-55
Soil	9 (c)	4 (c)	4 (c)
Sediment	N/A	4 (g)	
Vegetation	19 (c)	8 (c)	4 (c)

### Equipment needed

Additional specific equipment required for going into the field is given in the procedure "General Field Safety for All Employees" (RRES-ES-Field).

The following equipment is required for all sampling:

- safety glasses
- rubber gloves
- tape measure
- permanent marker for labeling
- ice chest with blue ice
- zip-lock bags (gallon size)
- chain-of-custody forms (Attachment 2), tape

Additional equipment needed for each medium in addition to the above

#### Soil Sampling

- stainless steel soil ring (10-cm diameter), top, and ring-spatula
- 3-lb hammer
- soap/water solution (for washing ring), water (rinsing), paper towels
- 500-mL & 125-mL polyethylene bottles (1 for each composite sample)

#### Sediment Sampling

- disposable polyethylene scoops
- 500-mL & 125-mL polyethylene bottles (1 for each composite sample)

#### Vegetation Sampling

- gardening shears

## Sample Collection, continued

**Before leaving for the field** Check the condition of the vehicle and the fuel level. Identify a Point-of-Contact (providing pertinent information of destination, expected time-in, and how to notify field team). When leaving Los Alamos County, notify the group office to place you on travel status. Ensure that you have a working cell phone and a pager.

**Steps for sampling soil** Sampling guidelines set by the American Society for Testing and Materials (ASTM) were used to develop the guidelines followed by the Environmental Surveillance Team. Each year, plan trips to facility sampling locations and perform the following steps:

Step	Action
1	Locate the center of the sampling area, and place a clean 10-cm (4-in.) diameter stainless steel ring on the surface (see Attachment 3). Cover the ring with the stainless steel top.
2	Using a 3-lb hammer, drive the stainless steel ring 5 cm (2.0 in.) deep into the ground at the center and corners of a square area, 10-m (33-ft) per side. After driving the ring-sampler at each point, remove soil next to the soil ring-sampler, slip the spatula underneath the ring, and lift the sample. Place each of the five sub-samples into a 1-gallon zip-lock bag.
3	Thoroughly mix the sub-samples in the zip-lock bag to form a composite sample. Pour the composite into a 125-mL polyethylene bottle (for heavy-metal analysis) and a 500-mL poly bottle (for radionuclide analysis).
4	Seal each bottle with chain-of-custody tape. Label the bottle with the sample location, date, time, and your initials. Place each bottle into a 1-gallon zip-lock bag and then into ice chest.
5	Complete a chain-of-custody form (Attachment 2) with the appropriate sampling information. Maintain proper chain-of-custody on the samples. See chapter <i>Chain-of-custody for samples</i> .
6	Wash ring, spatula, and top with the soap/water solution, rinse with water, and then dry with paper towels.
7	Once at the Lab, store the samples on ice or in a freezer until samples are shipped to the analytical laboratory (normally within two working days). Follow preparation and processing methods described in MAQ-706 ("Processing and Submitting Samples").

## Sample Collection, continued

### Steps for sampling sediments

To collect sediment samples, perform the following steps:

Step	Action
1	<p>Locate the sampling areas. Using a disposable polyethylene scoop, collect sediments to a depth of 5 cm (2 in.) in both a 125-mL (for heavy metal sampling) and a 500-mL (for radionuclide sampling) polyethylene bottle.</p> <ul style="list-style-type: none"> <li>perennial streams: sample in dune buildup behind boulders in the main channel</li> <li>ephemeral streams: sample in the center of the main channel</li> </ul>
2	<p>Seal each bottle with chain-of-custody tape. Label the bottle with the sample location, date, time, and your initials. Place each bottle into a 1-gallon zip-lock bag.</p>
3	<p>Place the bags in the cooler with ice for transport back to the laboratory. Complete a chain-of-custody form (Attachment 2) with the appropriate sampling information. Maintain proper chain-of-custody on the samples. See chapter <i>Chain-of-custody for samples</i>.</p>
5	<p>Once at the lab, store the samples on ice or in a freezer until samples are shipped to the analytical laboratory (normally within two working days). Follow preparation and processing methods described in MAQ-706 (<i>Processing and Submitting Samples</i>).</p>

## Sample Collection, continued

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### Steps for sampling vegetation

To collect vegetation samples, perform the following steps:

Step	Action
1	Collect approximately three pounds of vegetation and place into a zip-lock bag. Label the bag with the sample location, date, time, and your initials.
2	Place the bags in the cooler with ice for transport back to the Laboratory. Complete a chain-of-custody form (Attachment 1) with the appropriate sampling information. Maintain proper chain-of-custody procedures for samples until they are shipped to the analytical laboratory. See chapter <i>Chain-of-custody for samples</i> .
3	Once at the Lab, store the samples on ice or in a freezer until samples are processed (normally within two working days). Follow preparation and processing methods described in MAQ-706 ( <i>Processing and Submitting Samples</i> ).



## Chain-of-custody for samples

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### Maintaining custody of samples

A sample is physical evidence collected from a facility or the environment. Chain-of-custody must be documented for all samples used to demonstrate compliance. Verify that the possession and handling of samples is traceable at all times. A sample is considered in custody if it is one of the following:

- In one's physical possession.
- In one's view after being in one's physical possession.
- In one's physical possession and then locked up so that no one can tamper with it.
- Kept in a secure area where access is restricted to authorized and accountable personnel only.

**NOTE:** A secured area is an area that is locked, such as a room, cooler, vehicle, or refrigerator. If the area cannot be secured by locking, use a custody seal to secure the area or the sample container.

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### Transferring custody of samples

Whenever samples are transferred into the custody of another person or organization, complete the "relinquished by/received by" and "date" sections of the form (Attachment 2). These sections of the form must provide a complete history of custody of the samples from collection to transfer to the analytical laboratory.

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### If chain-of-custody is broken

Whenever there is a break in the chain of custody of a sample, document the failure by initiating a deficiency report in accordance with the procedure for deficiencies (MAQ-026). [The deficiency process will document the occurrence, evaluate the potential impact (if any) on the samples, and propose a fix to prevent recurrence.]

## Records resulting from this procedure

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### Records

The following records generated as a result of this procedure are to be submitted **within one year** as records to the records coordinator:

- Chain-of-Custody record

## HAZARD REVIEW FOR FACILITY SOIL AND VEGETATION SAMPLING

Work tasks/Steps	Hazards, Concerns, and Potential accidents; Likelihood/ Severity	Controls, Preventive Measures (e.g., safety equipment, administrative controls, etc.)	Hazard Level from IMP 300-00-00 Hazard Grading Matrix
Travel to sampling sites in the field	Various field and outdoor hazards such as seasonal heat and cold extremes, wind, sun exposure, lightning, insects, reptiles, slips, falls, brush  remote/moderate = low	Train to RRES-ES-Field, "General Field Safety for all Employees". Wear level 4 ppe that includes pants, long-sleeve shirt, hard hat, safety glasses, steel toed safety shoes, and gloves.	Low
Enter TA-55 to collect samples	Radionuclide contamination  Occasional /moderate = low  (Note: : Process of knowledge of radionuclide contaminants at TA-55 show that they are within screening action levels and far below regulatory levels; there are no metals above background)	Follow all site-specific training and entry requirements.  Review a copy of the last sampling event, "Environmental Surveillance at LANL during 2001, LANL report LA-13979-ENV (2002) for a description of results	
Enter DARHT to collect samples	Radionuclides and Be contamination  remote/ moderate = low  (Note: Process of knowledge of radionuclide and Be contaminants at the DARHT site show that they are within background concentrations)	Follow all site-specific training and entry requirements. Access control check-in required for DARHT.  Review a copy of the last sampling event, "Concentrations of Radionuclides and Trace Elements in Soils and Vegetation Around the DARHT Facility during 2004, LANL report LA-14176 (2004) for a description of results.  Note: because of the concern for Be by the DARHT H&S people, they may require that one soil sampling site {soil north} be sampled with a full face respirator if the ground is not moist.	

Work tasks/Steps	Hazards, Concerns, and Potential accidents; Likelihood/ Severity	Controls, Preventive Measures (e.g., safety equipment, administrative controls, etc.)	Hazard Level from IMP 300-00-00 Hazard Grading Matrix
Enter Area G to collect samples	Radionuclide contamination  remote/ moderate = low  (Note: : Process of knowledge of radionuclide contaminants at TA-55 show that they are within screening action levels and far below regulatory levels; there are no metals above background)	Follow all site-specific training and entry requirements. Facility-specific training is needed for Area G  Review a copy of the last sampling event, "Radionuclide Concentrations I Soils and Vegetatin at Low-Level Radioactive Waste Disposal Area G during 2004, LANL report LA-14181 (2004) for a description of results.	
Collect soil samples according to steps for soil sample collection in the chapter "Collecting Samples"	Smashing fingers, toes, head and eyes with soil sampling tool.  Occasional /moderate = low	Review MAQ-711 "Facility Soil and Vegetation Sampling" protocol for sampling procedures. Wear PPE.	Low
Collect sediment samples according to steps for sediment sample collection in the chapter "Collecting Samples"	Hammering injury (smashed fingers) & flying debris from use of ring and hammer  Ergonomic injuries (repetitive motion)  Occasional /moderate = low	Wear the minimum PPE as described above.  Take a short break every hour.	
Collect vegetation samples according to steps for vegetation sample collection in the chapter "Collecting Samples"	Cutting fingers, dropping on toes, poking eyes with vegetation cutting shears  Occasional /moderate = low	Use care when cuttingwith shears aand clippers -- wear protective (Kevlar) gloves.	

**Wastes or  
residual  
materials**

Sample materials will be disposed by analytical laboratory.

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**Emergency actions to take in event of control failure** For cuts, perform First Aid as appropriate. Go to hospital for serious injuries. Go to HSR-2 for evaluation. Notify supervisor ASAP.



MAQ, Meteorology and Air Quality

## Environmental Surveillance Team Chain-of-Custody Record

This form is from MAQ-711

<b>Project Contact</b> _____  <b>Contact Phone No.</b> _____ <b>MS</b> _____	<b>Project Name</b> Facility Sampling Soils, sediments, and vegetation  _____  _____	<b>Account</b> _____ <b>Code</b> _____ <b>Cost</b> _____ <b>Center</b> _____ <b>Program</b> _____ <b>Code</b> _____
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Date Collected	Time Collected	Station Name/Number	Number of Samples	Analysis Requested	Remarks

Relinquished by (print and sign)	Date	Relinquished by (print and sign)	Date	Relinquished by (print and sign)	Date
	Time		Time		Time
Received by (print and sign)	Date	Received by (print and sign)	Date	Received by (print and sign)	Date
	Time		Time		Time

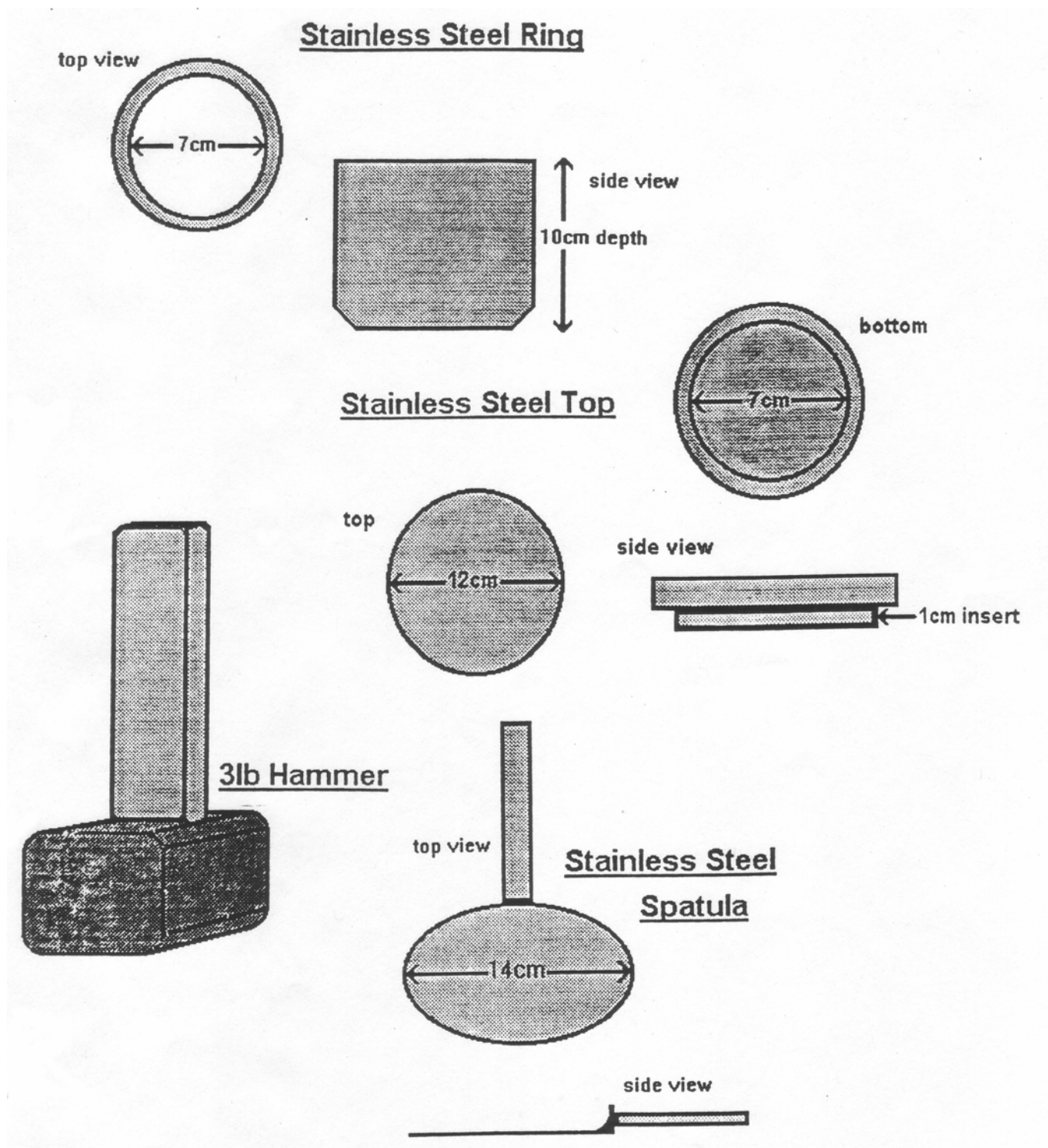
**Samplers (print names and initial)** \_\_\_\_\_

**Comments**



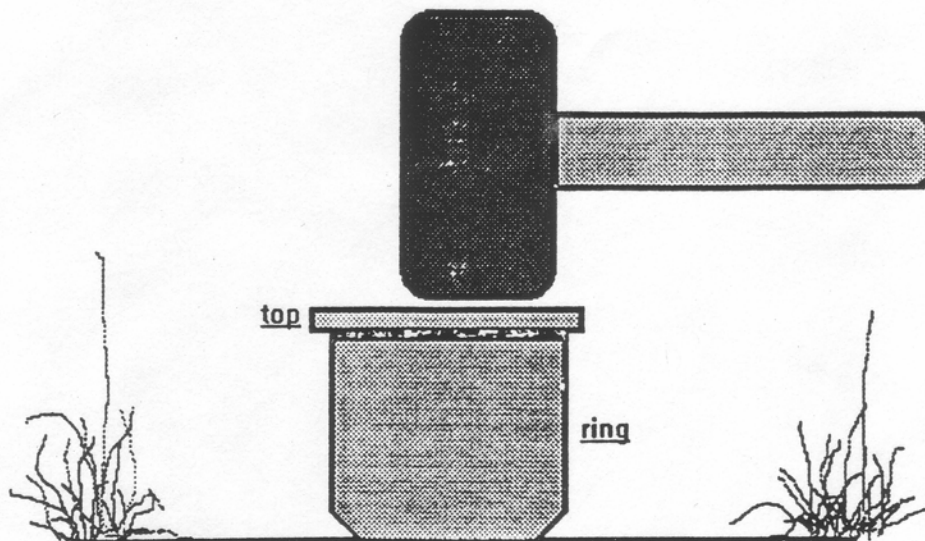


### Soil Sampling Equipment and Diagram

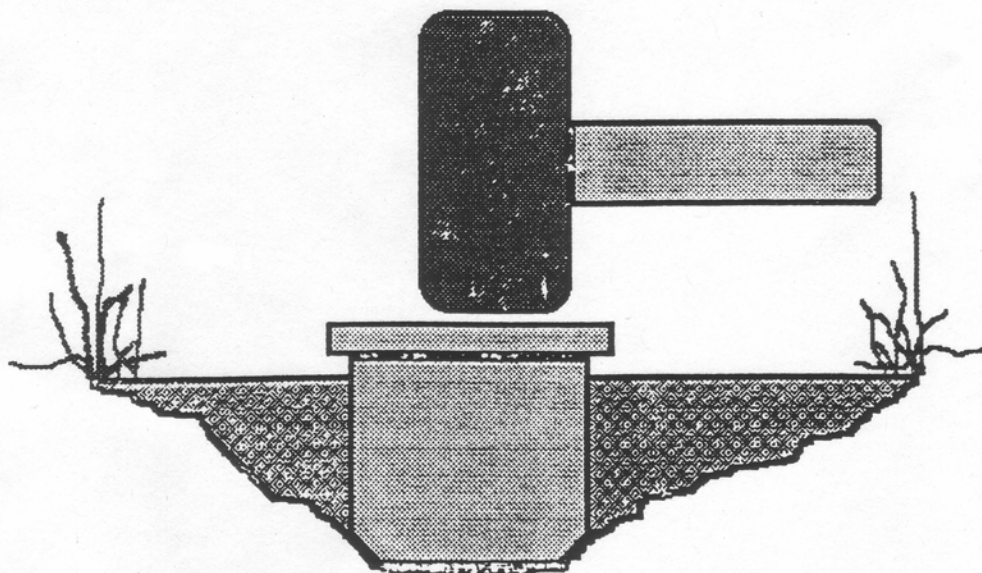


### Soil Sampling Equipment and Diagram, Continued

Step 1. place ring on soil and start hammering

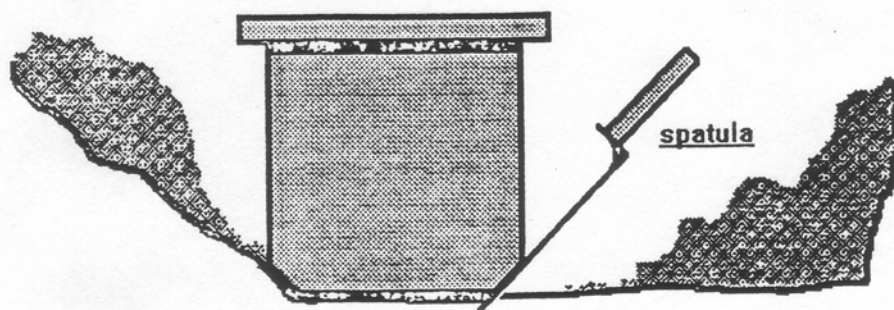


Step 2. hammer ring into soil



Soil Sampling Equipment and Diagram, Continued

Step 3. remove soil from surrounding of ring with spatula



Step 4. remove ring from soil with spatula and place soil into a sampling bag

